

Fig.1

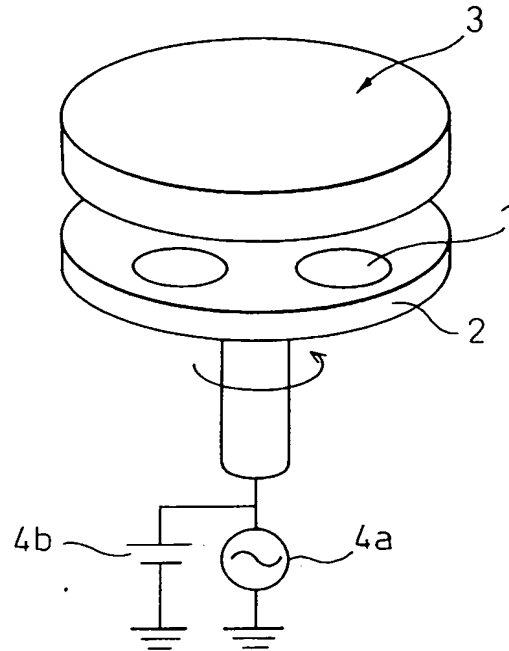


Fig.2

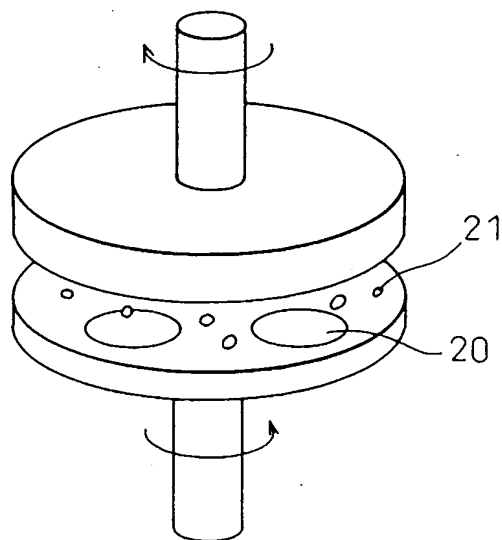


Fig.3

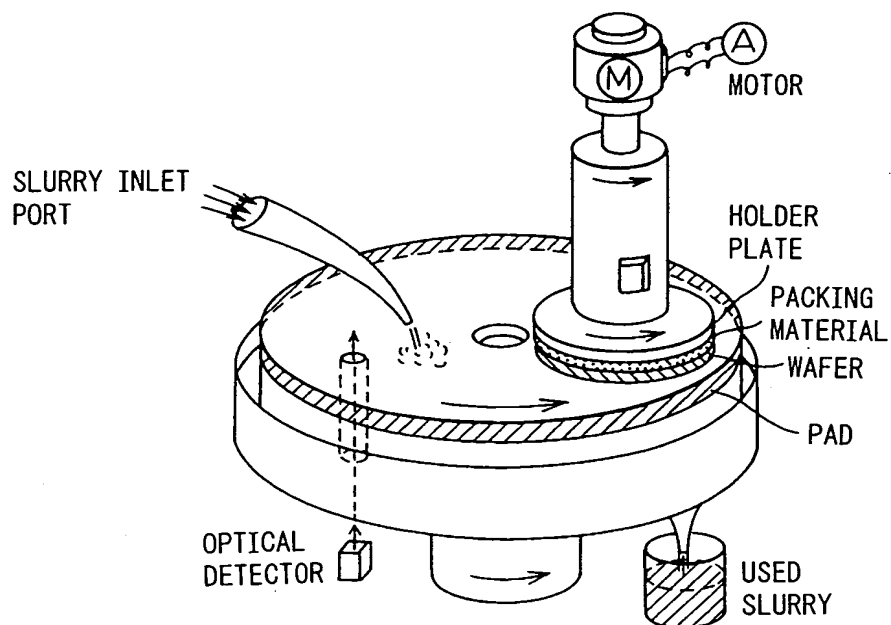


Fig.4

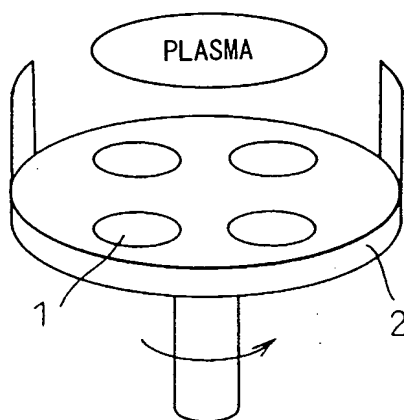


Fig.5

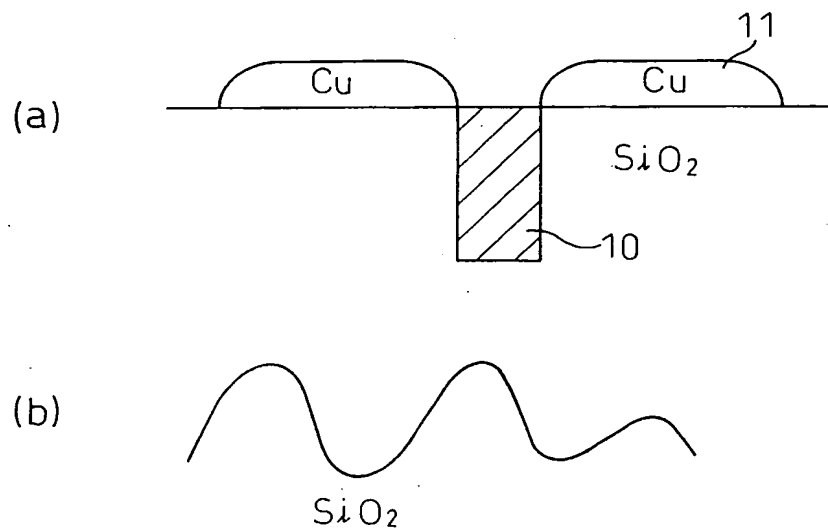
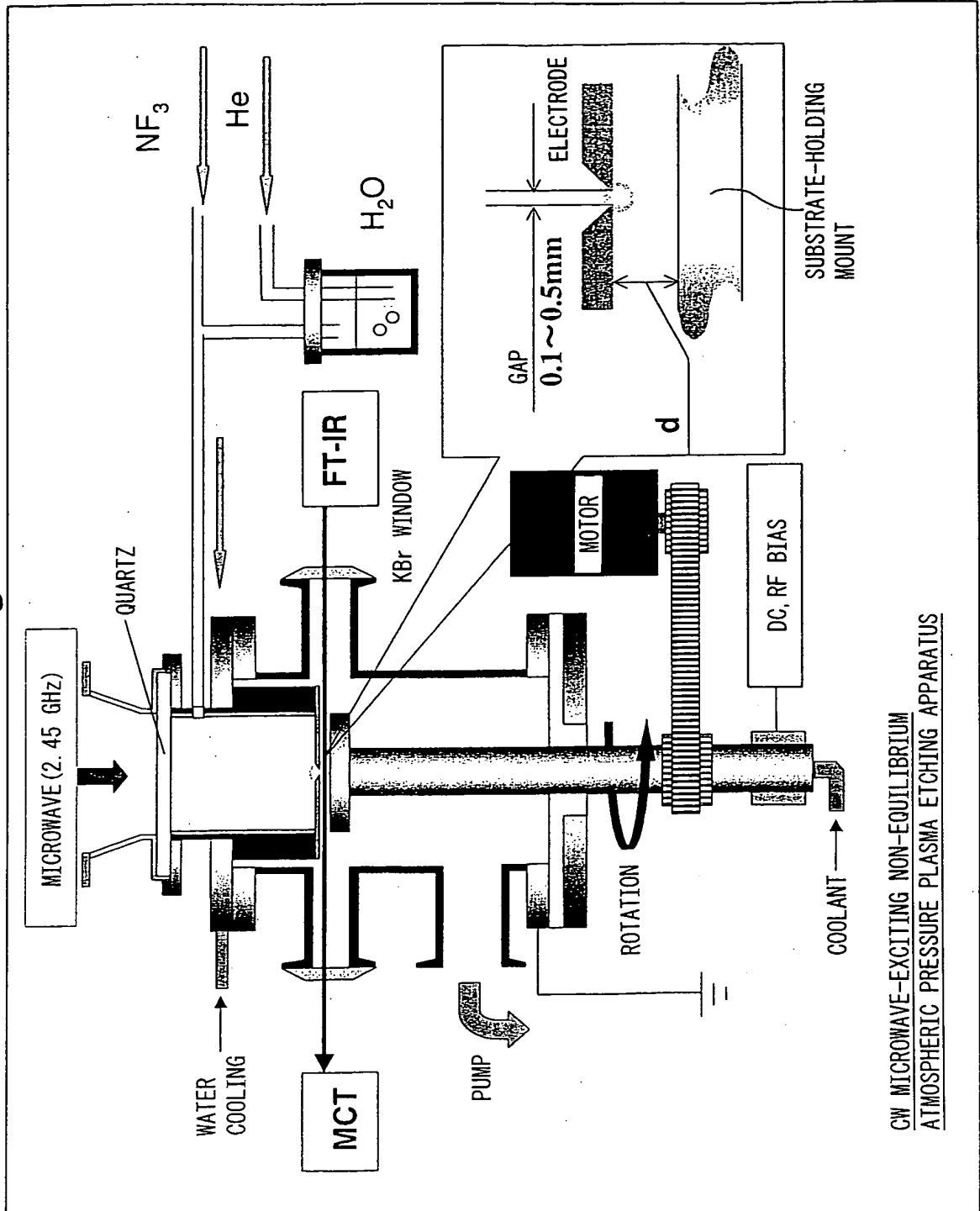


Fig.6

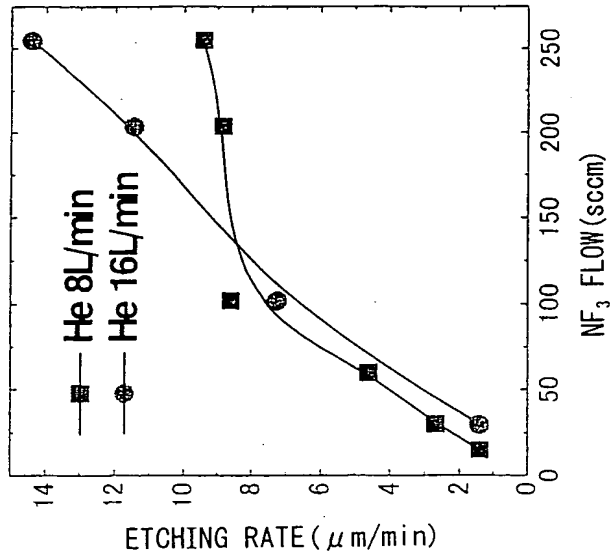


CW MICROWAVE-EXCITING NON-EQUILIBRIUM  
ATMOSPHERIC PRESSURE PLASMA ETCHING APPARATUS

Fig.7

**SiO<sub>2</sub> HIGH-SPEED ETCHING**

POWER: 500W, PRESSURE: 760Torr, H<sub>2</sub>O BUBBLING  
SUBSTRATE TEMP.: 18°C, GAP: 0.2mm



ETCHING RATE,  
14 μm/min

H<sub>2</sub>O POURING RATE VARIES DEPENDING  
UPON THE He CARRIER GAS FLOW RATE

● H<sub>2</sub>O POURING RATE

(He 8L/min) < (He 16L/min)

● WHEN He 16L/min, THE ETCHING RATE IS  
DETERMINED BY NF<sub>3</sub> FLOW RATE

● WHEN He 8L/min, AND NF<sub>3</sub> FLOW RATE IS  
100sccm OR MORE, THE ETCHING RATE IS  
SATURATED DUE TO THE LACK OF H FROM H<sub>2</sub>O

FEEDING RATES ARE BALANCED BETWEEN H FROM  
H<sub>2</sub>O AND F FROM NF<sub>3</sub>

Fig.8

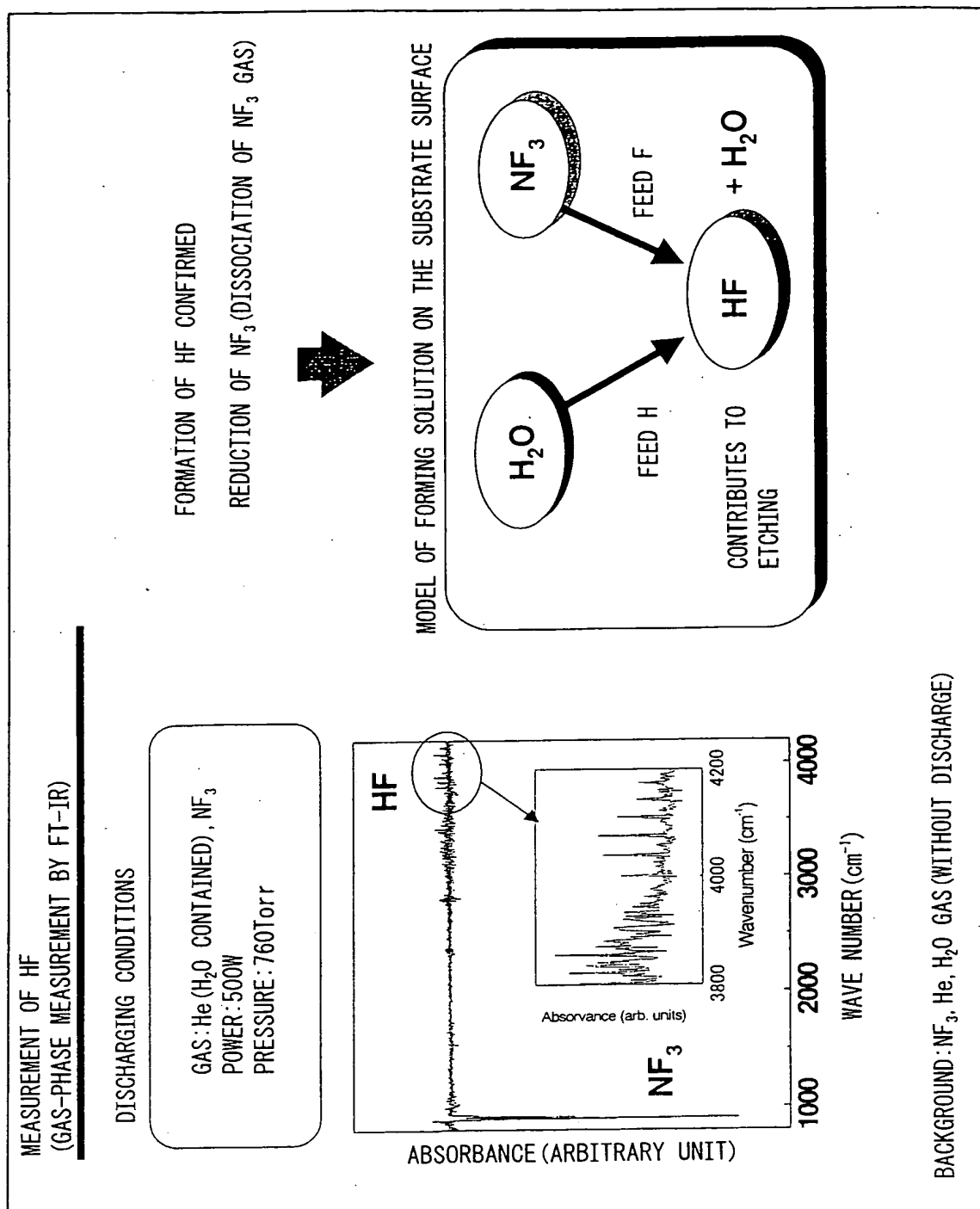
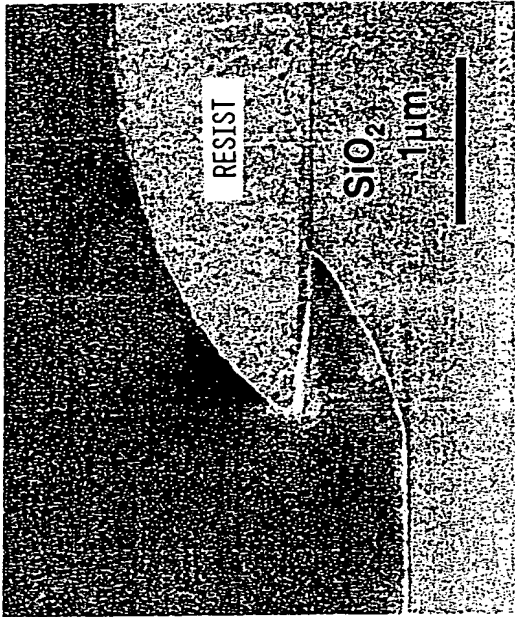


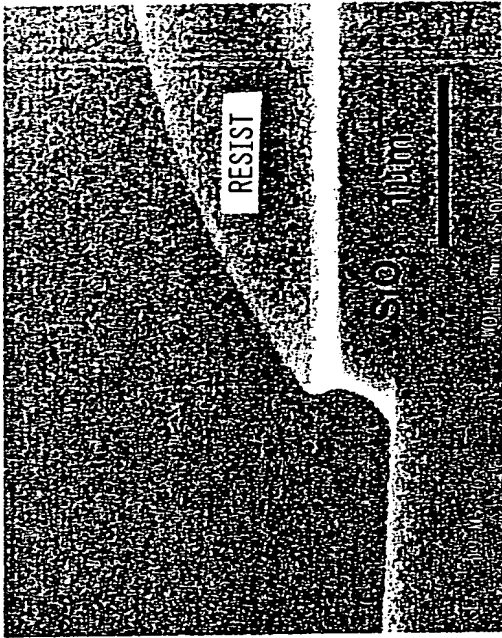
Fig.9

PATTERN ETCHING USING RESIST MASK

GAS: He (H<sub>2</sub>O CONTAINED), NF<sub>3</sub>  
SUBSTRATE-ELECTRODE DISTANCE: 5mm  
POWER: 500W  
PRESSURE: 760Torr



GAS: He (H<sub>2</sub>O CONTAINED), NF<sub>3</sub>, C<sub>4</sub>F<sub>8</sub>  
SUBSTRATE-ELECTRODE DISTANCE: 5mm  
POWER: 500W  
PRESSURE: 760Torr



- VERY HIGH SELECTION RATIO RELATIVE TO THE RESIST
- VERTICAL PROCESSING